carotid artery stenting and peripheral artery stenting. However, in PCI, simulation-based training is not yet established and thus we have no previous experience in this area. The aim of this study is to assess the utility of the new artery based simulation system for PCI.
Methods: We reconstructed the whole body type PCI simulating vascular model from the imaging data of 64 raw MDCT, including coronary arteries with a significant stenosis (type A of the AHA/ACC classification) which consisted of materials which can be dilated and can preserve the dilated lumen. We enrolled 14 interventional residents who had no experience in performing PCI but who received lectures for the techniques of PCI and 5 interventional cardiologists who had experienced more than 350 PCI procedures. We divided them into 3 groups: Group A (only lecture), Group B (lecture plus training with the simulator) and Group C (experienced interventionalists). Practical examination using the simulator was performed. Results of examination were graded by one attending interventional cardiologist, using the scoring system of Cardiovascular InterVention and Therapeutics (CVIT). Procedural time, contrast volume, fluoroscopy time were measured.
Results: The score was significantly higher in Group B (112 ± 5.0; p = 0.01) and Group C (121 ± 2.5; p = 0.001) compared with Group A (101 ± 10.1).There was singnificant more use of contrast dye in Group B (94.9 ± 15.5ml; p=0.04) and Group C (174.0 ± 12.9ml; p = 0.008) compared to Group A (129.2 ± 35.0ml). Group C significantly reduced procedural time, contrast volume, and fluoroscopy time compared to Group A and B.
Conclusions: New Artery based simulator is very useful tool for training and evaluating PCI techniques.

POSTERS

TCT-325

Patients skin radiation doses in a contemporary cohort of patients undergoing percutaneous interventional cardiology procedures.

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Background: The field of interventional cardiology has drastically developed over last years, currently evolving into more complex procedures with increasing image quality requirement. These procedures result in substantial patient radiation doses.
Methods: To evaluate this fact, we analysed radiation doses exposure in 2417 patients undergoing interventional cardiology procedures: diagnostic coronary angiography (DCA): 1328 (54.9%); percutaneous coronary intervention (PCI): 1043 (43.2%); structural heart intervention (SHI) 42 (1.7%); and renal denervation (RD) 4 (0.2%). These procedures were consecutively performed by five skilled interventional cardiologist using three x-ray equipments (Allura Xper FD10, Philips®). All X-ray systems were calibrated using the same protocol. Skin dose (SD) was calculated using air kerma calibrated at interventional reference point and applying a factor that takes into account the X-ray backscatter from the patient.
Results: SD according to the type of interventional cardiology procedure are shown in the table. In 4.2% of the patients, the SD exceeded the 3 Gy dose threshold for deterministic effects (DCA: 2.9%, PCI: 6.0%, SHI: 4.8%, RD: 0%). Weight, contrast volume, fluoro time, number of stents were variables related to SD. Fluoro time (minutes) was the variable most closely related to SD in all the procedures (b=240.4; p<0.0001).

Radiation dose measurements (mGy).

Procedure	N	Mean	Median	25th Percentile	75th Percentile
DCA	1328	1910.7	448.2	303.6	629.0
PCI	1043	3729.8	914.7	624.2	1415.5
Bifurcated lesion	64	9816.6	1259.7	877.6	2008.3
Chronic total occlusion	12	2207.9	2334.8	851.9	3268.0
SHI	42	1089.7	829.2	500.9	1486.9
TAVI	13	1583.3	1191.3	992.2	2457.5
LAA Closure	7	1639.5	1029.2	686.3	1772.9
ASD Closure	13	369.8	389.5	113.6	653.7
MVP	6	558.4	589.1	278.6	814.6
CAF Closure	1	3044.5	NA	NA	NA
PI-VSD Closure	1	1636.5	NA	NA	NA
Ductus Closure	1	870.1	NA	NA	NA
RD	4	851.8	777.6	444.7	1333.0

TAVI: Transfemoral aortic valve implantation; LAA: Left atrial appendage; ASD: Atrial septal defects; MVP: Mitral valvuloplasty; CAF: Coronary artery fistula; PI-VSD: Postinfarction ventricular septal defect; RD: Renal denervation; NA: Not applicable.

Conclusions: High radiation doses in some complex percutaneous cardiac interventions must encourage interventional cardiologist to develop radiation dose reduction protocols, radiation protection training programs and to perform an adequate follow-up of the patients undergoing this procedures.

TCT-326

The Occupational Effects of Interventional Cardiology Results from the WIN for Safety Survey

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Background: Interventional cardiologists are amongst the most intensive radiation users within medicine.
Methods: A ‘WIN for Safety’ web-based survey was distributed through EAPCI to all catheterization laboratory healthcare professionals, enquiring about radiation protection measures, compliance with monitoring, health (orthopaedic issues), radiation-associated problems (cataracts and cancer) and restrictions imposed upon the pregnant female.
Results: In total, there were 615 participants: 72.8% were interventional cardiologists. Most (73.5%) of them were male and 63.3% were aged 31-50 years. A radiation collar badge was used by the majority (64.4%) and the most frequently utilized protective measure was the thyroid shield (87.2%). Potential illnesses related to radiation exposure included 19.5% orthopaedic problems (back/neck/hip pain), 5.5% varicose veins, 2.4% blood count problems and 2.0% cataracts. Notably, an association between orthopaedic problems and years of exposure was found (p=0.001). Overall, only 2.2% had ever been diagnosed with a cancer, with a trend for more females to be affected (4.4% vs. 1.8%; p=0.067). Finally, 62.1% have restrictions imposed upon the pregnant female in the working environment.
Conclusions: Awareness of radiation in the field of interventional cardiology is essential. The main risk is orthopaedic problems and measures should be taken for prevention. Cancer has not been demonstrated to be a direct consequence, however we should remain vigilant and monitor individuals.

TCT-327

Rotational angiography with 3D reconstruction following motion field estimation for evaluation of geometry of the implanted Medtronic Corevalve frame: comparison with MSCT

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Background: Evaluation of the geometry of the implanted Medtronic Corevalve (MCS) frame requires a 3D imaging modality. Rotational angiography (RA) allows 3D reconstruction but the poor temporal resolution precludes compensation for cardiac motion. Novel mathematical algorithms can estimate motion fields allowing motion compensation for image reconstruction of sparse objects.We compared the geometry of the motion compensated RA model with MSCT (gold standard).
Methods: After TAVI a 5 second RA was performed of the implanted MCS frame. A prototype workstation was used for estimation of and correction for motion fields which allows 3D reconstruction of the MCS frame based on all images acquired throughout the cardiac cycle. Additionally retrospective ECG-triggered contrast MSCT was obtained 1 week after TAVI followed by single phase reconstruction of a 3D dataset. A standard MSCT workstation (MMWP, Siemens, Forcheim, Germany) was used to obtain short-axis images of the MCS frame at 4 levels: 1) the inflow, 2) the nadirs of the new leaflets, 3) central coaptation of the leaflets, 4) the commissures. At each level orthogonal smallest (Dmin) and largest (Dmax) diameters, asymmetry (Dmax/Dmin) and area (CSA) were measured on both RA and MSCT. Data for 5 cases are presented here. A extended and detailed analysis of 50 cases will be available for the conference.
Results: The Dmin, Dmax and CSA measurements obtained by MSCT and RA were highly correlated at the different levels (e.g. CSA at inflow R=0.99, nadirs R=0.98, coaptation R=0.90, all p<0.05). There were no significant differences between MSCT and RA measurements of Dmin, Dmax or CSA at any of the 4 levels. None of the CRS frames reached nominal dimensions as measured by either MSCT or R-angio. The asymmetry of the frame decreased progressively across inflow, nadirs, coaptation to the commissures as measured by both MSCT (Dmax/Dmin respectively 1.20, 1.16, 1.07, 1.03) and RA (respectively 1.25, 1.22, 1.06, 1.04).
Conclusions: RA with motion field compensated 3D-reconstruction allows accurate evaluation of 3D prosthesis frame geometry in comparison with MSCT and is available in the catheter laboratory at the time of TAVI.